CLAIMS

I claim:

1. A method for sellers and buyers to trade multiple dissimilar products.

2. A method as claimed in 1 is set up of data processing machine site for facilitating trade of multiple dissimilar products comprising at least one server data processing machine designed for serving a host of client data processing machines and provide said server data processing machines with the capability to participate in various trades where the trading is of a multiple dissimilar products at a specified time with a specified number of the multiple dissimilar products available for trade;

   the said server data processing machine cooperating with database data processing machine to store the data

   sellers, buyers and users of the system access the server data processing machine through the client data processing machine and trade their products

   an optimization program resides in the server data processing machine to process the data and calculate winning bids

3. A method for sellers to sell multiple dissimilar products comprising steps of:

   a. setting up a system as recited in claim 2
   b. sellers set up their items for sale accessing the server data processing machine through client data processing machine
   c. seller enters the items that he/she wishes to sell, the time the bidding process expires and the type of auction
   d. the seller specifies additional information such as but not limited to shipping and handling, tax etc. or any other cost related to the trade
   e. seller specifies the type of bidding process as an open-bid or a sealed-bid process
   f. buyers or bidders bid for products by accessing server data processing machine through the client data processing machines comprising steps of:
      i. buyers pick and choose individual items or a group of items they wish to buy and bid for the items
      ii. buyers picking any combination of items in any quantity: the quantity chosen by bidder j satisfies the following equation:

      $$0 <= Q_i^j <= Q_i.$$

      Where

      Q_i^j is quantity of item i chosen by bidder j

      Q_i is the quantity of item i put for sale by seller

iii. the server data processing machine accepts the bids from buyers and stores them in the database

iv. the optimization program residing in the server data processing machine processes the bids and calculates the winning bids based on the bid amount and additional information provided by seller as recited in claim 3.d to find the winning bids

v. the winning bids claimed in 3.f.iv are calculated such that the seller gets the maximum revenue

vi. the optimization program as claimed in 3.f.iv solves the following problem:

Maximize:
$P_1*Y_1 + P_2*Y_2 + \ldots\ldots P_n* Y_n$

Within constraints:

$Q_1^1 + Q_1^2 + Q_1^3 + \ldots\ldots\ldots + Q_1^n <= Q_1$
$Q_2^1 + Q_2^2 + Q_2^3 + \ldots\ldots\ldots + Q_2^n <= Q_2$
.
.
$Q_m^1 + Q_m^2 + Q_m^3 + \ldots\ldots\ldots + Q_m^n <= Q_m$

Y_1 either 0 or 1
Y_2 either 0 or 1
.
.
Y_n either 0 or 1

Where

Q_i is the quantity of item i in the lot

m is the number of different products classes in the lot

n is the number of bids

P_j is the profit to the seller if bidder j is one of the winning bids. P_j is the equal to the bid amount of bidder j minus any associated cost that will be borne by the seller by choosing bidder j as the winning bid

Q_m^n is the quantity of item m chosen by buyer n

vii. the method in claim 3.f.vi uses any of the following optimization techniques for optimization: linear programming, integer programming, domain reduction and constraint propagation,

combinatorial optimization, genetic algorithms, simulated annealing or any other way for solving the problem that might be available

viii. the optimization program claimed in 3.f.vi solves for values of Y_i, i = 1 to n

ix. if Y_n is 1, then bid n is one of the winning bids.

x. step 3.f.iv is executed whenever a new bid is submitted as claimed in 3.f.i.

xi. steps 3.f.i to 3.f.iv go on till the time the bidding process ends at the time specified in 3.c

xii. After the expiration of time specified in 3.c, the bidding process ends and the winners are declared based on the last process run by step 3.f.iv

xiii. if the bidding process is an open-bid process, then winning bids are displayed continuously to the buyers during the bidding process else if the process is a sealed-bid process, then the winning bids are not displayed to the buyers until after the bidding ends and winner are declared

4. A method for sellers to sell multiple dissimilar products comprising steps of:

a. setting up a system as recited in claim 2

b. sellers set up their items for sale accessing the server data processing machine through client data processing machine

c. seller enters the items that he/she wishes to sell, the time the bidding process expires and the type of auction

d. the seller specifies a reserve price (R) for the whole lot

e. the seller specifies additional information such as but not limited to shipping and handling, tax etc. or any other cost related to the trade

f. seller specifies the type of bidding process as an open-bid or a sealed-bid process

g. buyers or bidders bid for products by accessing server data processing machine through the client data processing machines comprising steps of:

i. buyers pick and choose individual items or a group of items they wish to buy and bid for the items

ii. buyers picking any combination of items in any quantity: the quantity chosen by bidder j satisfies the following equation:

$$0 <= Q_i^j <= Q_i.$$

Where

Q_i^j is quantity of item i chosen by bidder j

Q_i is the quantity of item i put for sale by bidder

iii. the server data processing machine accepts the bids from buyers and stores them in the database

iv. the optimization program residing in the server data processing machine processes the bids and calculates the winning bids based

on the bid amount and additional information provided by seller as recited in claim 4.e to find the winning bids

v. the winning bids claimed in 4.g.iv are calculated such that the seller gets the maximum revenue

vi. the optimization program as claimed in 4.g.iv solves the following problem:

Maximize:
$P_1*Y_1 + P_2*Y_2 + \ldots\ldots P_n* Y_n$

Within constraints:

$Q_1^1 + Q_1^2 + Q_1^3 + \ldots\ldots\ldots + Q_1^n <= Q_1$
$Q_2^1 + Q_2^2 + Q_2^3 + \ldots\ldots\ldots + Q_2^n <= Q_2$
.
.
$Q_m^1 + Q_m^2 + Q_m^3 + \ldots\ldots\ldots + Q_m^n <= Q_m$

Y_1 either 0 or 1
Y_2 either 0 or 1
.
.
Y_n either 0 or 1

Where

Q_i is the quantity of item i in the lot

m is the number of different products classes in the lot

n is the number of bids

P_j is the profit to the seller if bidder j is one of the winning bids. P_j is the equal to the bid amount of bidder j minus any associated cost that will be borne by the seller by choosing bidder j as the winning bid

Q_m^n is the quantity of item m chosen by buyer n

vii. the method in 4.g.vi uses any of the following optimization techniques for optmization: linear programming, integer programming, domain reduction and constraint propagation, combinatorial optimization, genetic algorithms, simulated annealing or any other way for solving the problem that might be available

viii. the optimization program claimed in 4.g.vi solves for values of Y_i, i = 1 to n

ix. if $\sum P_i * Y_i$ for i = 1 to n is greater than or equal to reserve price (R) of claim 4.d, and if Y_n is 1, then bid n is one of the winning bids.
x. step 4.g.iv is executed whenever a new bid is submitted
xi. steps 4.g.i to 4.g.iv go on till the time the bidding process ends at the time specified in claim 4.c
xii. After the expiration of time specified in 4.c, the bidding process ends and the winners are declared based on the last process run by step 4.g.iv
xiii. if the bidding process is an open-bid process, then winning bids are displayed continuously to the buyers during the bidding process else if the process is a sealed-bid process, then the winning bids are not displayed to the buyers until after the bidding ends and winner are declared

5. A method for sellers to sell multiple dissimilar products comprising steps of:

a. setting up a system as recited in claim 2
b. sellers set up their items for sale accessing the server data processing machine through client data processing machine
c. seller enters the items that he/she wishes to sell, the time the bidding process expires and the type of auction
d. seller specifies a reserve price R_i for each unit of the item i in the lot. The seller will accept bid from a bidder only if bid amount B_j of bidder j is greater than or equal to $\sum R_i * Q_i^j$, i = 1 to m, where Q_i^j is the quantity of item i chosen for bidding by bidder j and m is the number of dissimilar items in the lot.
e. the seller specifies additional information such as but not limited to shipping and handling, tax etc. or any other cost related to the trade
f. seller specifies the type of bidding process as an open-bid or a sealed-bid process
g. buyers or bidders bid for products by accessing server data processing machine through the client data processing machines comprising steps of:
    i. buyers pick and choose individual items or a group of items they wish to buy and bid for the items
    ii. buyers picking any combination of items in any quantity: the quantity chosen by bidder j satisfies the following equation:
        $0 <= Q_i^j <= Q_i$.
        Where
            Q_i^j is quantity of item i chosen by bidder j
            Q_i is the quantity of item i put for sale by bidder
    iii. the server data processing machine accepts the bids from buyers and stores them in the database
    iv. the optimization program residing in the server data processing machine processes the bids and calculates the winning bids based

on the bid amount and additional information provided by seller as recited in claim 5.e to find the winning bids

v. the winning bids claimed in 5.g.iv are calculated such that the seller gets the maximum revenue

vi. the optimization program as claimed in 5.g.iv solves the following problem:

Maximize:
$P_1*Y_1 + P_2*Y_2 + \ldots\ldots P_n* Y_n$

Within constraints:

$Q_1^1 + Q_1^2 + Q_1^3 + \ldots\ldots\ldots + Q_1^n <= Q_1$
$Q_2^1 + Q_2^2 + Q_2^3 + \ldots\ldots\ldots + Q_2^n <= Q_2$
.
.
$Q_m^1 + Q_m^2 + Q_m^3 + \ldots\ldots\ldots + Q_m^n <= Q_m$

Y_1 either 0 or 1
Y_2 either 0 or 1
.
.
Y_n either 0 or 1

Where

Q_i is the quantity of item i in the lot

m is the number of different products classes in the lot

n is the number of bids

P_j is the profit to the seller if bidder j is one of the winning bids. P_j is the equal to the bid amount of bidder j minus any associated cost that will be borne by the seller by choosing bidder j as the winning bid

Q_m^n is the quantity of item m chosen by buyer n

vii. the method in 5.g.vi uses any of the following optimization techniques for optmization: linear programming, integer programming, domain reduction and constraint propagation, combinatorial optimization, genetic algorithms, simulated annealing or any other way for solving the problem that might be available

viii. the optimization program claimed in 5.g.vi solves for values of Y_i, i = 1 to n

ix. if Y_n is 1, then bid n is one of the winning bids.
x. step 5.g.iv is executed whenever a new bid is submitted
xi. steps 5.g.i to 5.g.iv go on till the time the bidding process ends at the time specified in 5.c
xii. After the expiration of time specified in 5.c, the bidding process ends and the winners are declared based on the last process run by step 5.g.iv
xiii. if the bidding process is an open-bid process, then winning bids are displayed continuously to the buyers during the bidding process else if the process is a sealed-bid process, then the winning bids are not displayed to the buyers until after the bidding ends and winner are declared

6. A method for buyers to buy multiple dissimilar products comprising steps of:

a. setting up a system as recited in claim 2
b. buyers set up items they wish to procure by accessing the server data processing machine from a client data processing machine through a computer network
c. buyer enters the items that he/she wishes to buy and enters the time the bidding process expires and type of auction
d. buyer specifies additional information such as but not limited to shipping and handling, tax etc. or any other cost associated with the trade
e. buyer specifies whether it is an open-bid or a sealed-bid process
f. sellers bid for the items by accessing server data processing machine through the client data processing machines comprising steps of:
    i. sellers pick and choose individual items or a group of items they wish to sell and bid for the items
    ii. sellers pick any combination of items in any quantity - quantity chosen by seller j satisfies the following equation:

$$0 <= Q_i^j <= Q_i.$$

Where

Q_i^j is quantity of item i chosen by seller j

Q_i is the quantity of item i buyer wants to procure

    iii. the server data processing machine accepts the bids and stores them in the database
    iv. the optimization program residing in the server data processing machine processes the bids and calculates the winning bids based on the bid amount and additional information provided by buyer as recited in claim 6.d to find the winning bids
    v. the winning bids claimed in 6.f.iv are calculated such that the buyer procures all items at the lowest cost
    vi. the optimization program as claimed in 6.f.iv solves the following problem:

Minimize: $P_1 * Y_1 + P_2 * Y_2 + \ldots\ldots P_n * Y_n$
Within constraints:

$Q_1^1 + Q_1^2 + Q_1^3 + \ldots\ldots\ldots + Q_1^n >= Q_1$
$Q_2^1 + Q_2^2 + Q_2^3 + \ldots\ldots\ldots + Q_2^n >= Q_2$

$Q_m^1 + Q_m^2 + Q_m^3 + \ldots\ldots\ldots + Q_m^n >= Q_m$

Y_1 either 0 or 1
Y_2 either 0 or 1

Y_n either 0 or 1

Where

Q_i is the quantity of item i in the lot

m is the number of different products classes in the lot

n is the number of bids

P_j is the net cost to the buyer if seller j is selected as one of the winning bids. P_j is the equal to the price quoted by seller j plus any additional cost that will be borne by the buyer for choosing seller j as the winning bidder

Q_m^n is the quantity of item m chosen by buyer n

vii. the method in 6.f.vi uses any of the following optimization techniques for optmization: linear programming, integer programming, domain reduction and constraint propagation, combinatorial optimization, genetic algorithms, simulated annealing or any other way for solving the problem that might be available

viii. the optimization program claimed in 6.f.vi solves for values of Y_i, i = 1 to n

ix. if Y_n is 1, then bid n is one of the winning bids.

x. step 6.f.iv is executed whenever a new bid is submitted

xi. step 6.f.i to 6.f.iv goes on till the time the bidding process ends at the time specified in 6.c

xii. after the expiration of time specified in 6.c, the bidding process ends and the winners are declared based on the last process run by step 6.f.iv

xiii. if the bidding process is an open-bid process, then winning bids are displayed continuously to the buyers during the bidding process else if the process is a sealed-bid process, then the winning bids are not displayed to the buyers until after the bidding ends and winner are declared

7. A method for buyers to buy multiple dissimilar products comprising steps of:

a. setting up a system as recited in claim 2
b. buyers set up items they wish to procure by accessing the server data processing machine from a client data processing machine through a computer network
c. buyer enters the items that he/she wishes to buy and enters the time the bidding process expires and type of auction
d. buyer specifies a reserve price (R) for the whole lot
e. buyer specifies additional information such as but not limited to shipping and handling, tax etc. or any other cost associated with the trade
f. buyer specifies whether it is an open-bid or a sealed-bid process
g. sellers bid for the items by accessing server data processing machine through the client data processing machines comprising steps of:
    i. sellers pick and choose individual items or a group of items they wish to sell and bid for the items
    ii. sellers pick any combination of items in any quantity - quantity chosen by seller j satisfies the following equation:

$$0 <= Q_i^j <= Q_i.$$

Where

Q_i^j is quantity of item i chosen by seller j

Q_i is the quantity of item i buyer wants to procure

    iii. the server data processing machine accepts the bids and stores them in the database
    iv. the optimization program residing in the server data processing machine processes the bids and calculates the winning bids based on the bid amount and additional information provided by buyer as recited in claim 7.e to find the winning bids
    v. the winning bids claimed in 7.g.iv are calculated such that the buyer procures all items at the lowest cost
    vi. the optimization program as claimed in 7.g.iv solves the following problem:

Minimize: $P_1*Y_1 + P_2*Y_2 + \ldots\ldots P_n* Y_n$

Within constraints:

$$Q_1^1 + Q_1^2 + Q_1^3 + \ldots\ldots\ldots + Q_1^n >= Q_1$$
$$Q_2^1 + Q_2^2 + Q_2^3 + \ldots\ldots\ldots + Q_2^n >= Q_2$$

$Q_m^1 + Q_m^2 + Q_m^3 + \ldots\ldots\ldots + Q_m^n >= Q_m$

Y_1 either 0 or 1
Y_2 either 0 or 1

Y_n either 0 or 1

Where

Q_i is the quantity of item i in the lot

m is the number of different products classes in the lot

n is the number of bids

P_j is the net cost to the buyer if seller j is selected as one of the winning bids. P_j is the equal to the price quoted by seller j plus any additional cost that will be borne by the buyer for choosing seller j as the winning bidder

Q_m^n is the quantity of item m chosen by buyer n

vii. the method in 7.g.vi uses any of the following optimization techniques for optmization: linear programming, integer programming, domain reduction and constraint propagation, combinatorial optimization, genetic algorithms, simulated annealing or any other way for solving the problem that might be available

viii. the optimization program claimed in 7.g.vi solves for values of Y_i, i = 1 to n

ix. if $\sum P_i * Y_i$ for i = 1 to n is less than or equal to reserve rice (R), and if Y_n is 1, then bid n is one of the winning bids.

x. step 7.g.iv is executed whenever a new bid is submitted

xi. steps 7.g.i to 7.g.iv go on till the time the bidding process ends at the time specified in 7.c

xii. after the expiration of time specified in 7.c, the bidding process ends and the winners are declared based on the last process run by step 7.g.iv

xiii. if the bidding process is an open-bid process, then winning bids are displayed continuously to the buyers during the bidding process else if the process is a sealed-bid process, then the winning bids are not displayed to the buyers until after the bidding ends and winner are declared

8. A method for buyers to buy multiple dissimilar products comprising steps of:

   a. setting up a system as recited in claim 2
   b. buyers set up items they wish to procure by accessing the server data processing machine from a client data processing machine through a computer network comprising steps of:
   c. buyer enters the items that he/she wishes to buy and enters the time the bidding process expires and type of auction
   d. buyer specifies a reserve price R_i for each unit of the item i in the lot. The buyer accepts bid from a seller only if bid amount B_j of seller j is less than or equal to $\sum R_i * Q_i^j$, i = 1 to m, where Q_i^j is the quantity of item i chosen for bidding by seller j and m is the number of dissimilar items in the lot
   e. buyer specifies additional information such as but not limited to shipping and handling, tax etc. or any other cost associated with the trade
   f. buyer specifies whether it is an open-bid or a sealed-bid process
   g. sellers bid for the items by accessing server data processing machine through the client data processing machines comprising steps of:
      i. sellers pick and choose individual items or a group of items they wish to sell and bid for the items
      ii. sellers pick any combination of items in any quantity - quantity chosen by seller j satisfies the following equation:

          $0 <= Q_i^j <= Q_i$.

          Where

          Q_i^j is quantity of item i chosen by seller j

          Q_i is the quantity of item i buyer wants to procure

      iii. the server data processing machine accepts the bids and stores them in the database
      iv. the optimization program residing in the server data processing machine processes the bids and calculates the winning bids based on the bid amount and additional information provided by buyer as recited in claim 8.e to find the winning bids
      v. the winning bids claimed in 8.g.iv are calculated such that the buyer procures all items at the lowest cost
      vi. the optimization program as claimed in 8.g.iv solves the following problem:

          Minimize: $P_1*Y_1 + P_2*Y_2 + \ldots\ldots P_n* Y_n$
          Within constraints:

          $Q_1^1 + Q_1^2 + Q_1^3 + \ldots\ldots\ldots + Q_1^n >= Q_1$
          $Q_2^1 + Q_2^2 + Q_2^3 + \ldots\ldots\ldots + Q_2^n >= Q_2$
          .
          .
          $Q_m^1 + Q_m^2 + Q_m^3 + \ldots\ldots\ldots + Q_m^n >= Q_m$

Y_1 either 0 or 1
Y_2 either 0 or 1

Y_n either 0 or 1

Where

Q_i is the quantity of item i in the lot

m is the number of different products classes in the lot

n is the number of bids

P_j is the net cost to the buyer if seller j is selected as one of the winning bids. P_j is the equal to the price quoted by seller j plus any additional cost that will be borne by the buyer for choosing seller j as the winning bidder

Q_m^n is the quantity of item m chosen by buyer n

vii. the method in 8.g.vi uses any of the following optimization techniques for optmization: linear programming, integer programming, domain reduction and constraint propagation, combinatorial optimization, genetic algorithms, simulated annealing or any other way for solving the problem that might be available

viii. the optimization program claimed in 8.g.vi solves for values of Y_i, i = 1 to n

ix. if Y_n is 1, then bid n is one of the winning bids.

x. step 8.g.iv is executed whenever a new bid is submitted

xi. steps 8.g.i to 8.g.iv go on till the time the bidding process ends at the time specified in 8.c

xii. after the expiration of time specified in 8.c, the bidding process ends and the winners are declared based on the last process run by step 8.g.iv

xiii. if the bidding process is an open-bid process, then winning bids are displayed continuously to the buyers during the bidding process else if the process is a sealed-bid process, then the winning bids are not displayed to the buyers until after the bidding ends and winner are declared

9. A method for buyers to buy multiple dissimilar products comprising steps of:

a. setting up a system as recited in claim 2

b. buyers set up items they wish to procure by accessing the server data processing machine from a client data processing machine through a computer network comprising steps of:
c. buyer enters the items that he/she wishes to buy and enters the time the bidding process expires and type of auction
d. buyer specifies additional information such as but not limited to shipping and handling, tax etc. or any other cost associated with the trade
e. buyer specifies whether it is an open-bid or a sealed-bid process
f. sellers bid for the items by accessing server data processing machine through the client data processing machines comprising steps of:
    i. sellers pick and choose individual items or a group of items they wish to sell and bid for the items
    ii. sellers pick any combination of items in any quantity - quantity chosen by seller j satisfies the following equation:

$$0 <= Q_i^j <= Q_i.$$

Where

Q_i^j is quantity of item i chosen by seller j

Q_i is the quantity of item i buyer wants to procure

    iii. the server data processing machine accepts the bids and stores them in the database
    iv. the optimization program residing in the server data processing machine processes the bids and calculates the winning bids based on the bid amount and additional information provided by buyer as recited in claim 9.d to find the winning bids
    v. the winning bids claimed in 9.f.iv are calculated such that the buyer procures all items at the lowest cost
    vi. the optimization program as claimed in 9.f.iv solves the following problem:

Minimize: $P_1*Y_1 + P_2*Y_2 + \ldots\ldots P_n* Y_n$

Within constraints:

$$Q_1^1 + Q_1^2 + Q_1^3 + \ldots\ldots\ldots + Q_1^n = Q_1$$
$$Q_2^1 + Q_2^2 + Q_2^3 + \ldots\ldots\ldots + Q_2^n = Q_2$$

$$Q_m^1 + Q_m^2 + Q_m^3 + \ldots\ldots\ldots + Q_m^n = Q_m$$

Y_1 either 0 or 1

Y_2 either 0 or 1

Y_n either 0 or 1

Where

Q_i is the quantity of item i in the lot

m is the number of different products classes in the lot

n is the number of bids

P_j is the net cost to the buyer if seller j is selected as one of the winning bids. P_j is the equal to the price quoted by seller j plus any additional cost that will be borne by the buyer for choosing seller j as the winning bidder

Q_m^n is the quantity of item m chosen by buyer n

vii. the method in 9.f.vi uses any of the following optimization techniques for optmization: linear programming, integer programming, domain reduction and constraint propagation, combinatorial optimization, genetic algorithms, simulated annealing or any other way for solving the problem that might be available

viii. the optimization program claimed in 9.f.vi solves for values of Y_i, i = 1 to n

ix. If Y_n is 1, then bid n is one of the winning bids.

x. step 9.f.iv is executed whenever a new bid is submitted

xi. steps 9.f.i to 9.f.iv go on till the time the bidding process ends at the time specified in 9.c

xii. after the expiration of time specified in 9.c, the bidding process ends and the winners are declared based on the last process run by step 9.f.iv

xiii. if the bidding process is an open-bid process, then winning bids are displayed continuously to the buyers during the bidding process else if the process is a sealed-bid process, then the winning bids are not displayed to the buyers until after the bidding ends and winner are declared

10. A method for buyers to buy multiple dissimilar products comprising steps of:

a. setting up a system as recited in claim 2
b. buyers set up items they wish to procure by accessing the server data processing machine from a client data processing machine through a computer network comprising steps of:
c. buyer enters the items that he/she wishes to buy and enters the time the bidding process expires and type of auction
d. buyer specifies a reserve price (R) for the whole lot
e. buyer specifies additional information such as but not limited to shipping and handling, tax etc. or any other cost associated with the trade

f. buyer specifies whether it is an open-bid or a sealed-bid process
g. sellers bid for the items by accessing server data processing machine through the client data processing machines comprising steps of:
    i. sellers pick and choose individual items or a group of items they wish to sell and bid for the items
    ii. sellers pick any combination of items in any quantity - quantity chosen by seller j satisfies the following equation:

$$0 <= Q_i^j <= Q_i.$$

Where

Q_i^j is quantity of item i chosen by seller j

Q_i is the quantity of item i buyer wants to procure

    iii. the server data processing machine accepts the bids and stores them in the database
    iv. the optimization program residing in the server data processing machine processes the bids and calculates the winning bids based on the bid amount and additional information provided by buyer as recited in claim 10.e to find the winning bids
    v. the winning bids claimed in 10.g.iv are calculated such that the buyer procures all items at the lowest cost
    vi. the optimization program as claimed in10.g.iv solves the following problem:

Minimize: $P_1*Y_1 + P_2*Y_2 + \ldots\ldots P_n* Y_n$

Within constraints:

$$Q_1^1 + Q_1^2 + Q_1^3 + \ldots\ldots\ldots + Q_1^n = Q_1$$
$$Q_2^1 + Q_2^2 + Q_2^3 + \ldots\ldots\ldots + Q_2^n = Q_2$$

$$Q_m^1 + Q_m^2 + Q_m^3 + \ldots\ldots\ldots + Q_m^n = Q_m$$

Y_1 either 0 or 1

Y_2 either 0 or 1

Y_n either 0 or 1

Where

Q_i is the quantity of item i in the lot

m is the number of different products classes in the lot

n is the number of bids

P_j is the net cost to the buyer if seller j is selected as one of the winning bids. P_j is the equal to the price quoted by seller j plus any additional cost that will be borne by the buyer for choosing seller j as the winning bidder

Q_m^n is the quantity of item m chosen by buyer n

vii. the method in 10.g.vi uses any of the following optimization techniques for optmization: linear programming, integer programming, domain reduction and constraint propagation, combinatorial optimization, genetic algorithms, simulated annealing or any other way for solving the problem that might be available

viii. the optimization program claimed in 10.g.vi solves for values of Y_i, i = 1 to n

ix. if $\sum P_i * Y_i$ for i = 1 to n is less than or equal to reserve rice (R), and if Y_n is 1, then bid n is one of the winning bids.

x. step 10.g.iv is executed whenever a new bid is submitted

xi. steps 10.g.i to 10.g.iv go on till the time the bidding process ends at the time specified in 10.c

xii. after the expiration of time specified in 10.c, the bidding process ends and the winners are declared based on the last process run by step 10.g.iv

xiii. if the bidding process is an open-bid process, then winning bids are displayed continuously to the buyers during the bidding process else if the process is a sealed-bid process, then the winning bids are not displayed to the buyers until after the bidding ends and winner are declared

11. A method for buyers to buy multiple dissimilar products comprising steps of:

a. setting up a system as recited in claim 2

b. buyers set up items they wish to procure by accessing the server data processing machine from a client data processing machine through a computer network comprising steps of:

c. buyer enters the items that he/she wishes to buy and enters the time the bidding process expires and type of auction

d. buyer specifies a reserve price R_i for each unit of the item i in the lot. The buyer accepts bid from a seller only if bid amount B_j of seller j is less than or equal to $\sum R_i * Q_i^j$, i = 1 to m, where Q_i^j is the quantity of item i chosen for bidding by seller j and m is the number of dissimilar items in the lot

e. buyer specifies additional information such as but not limited to shipping and handling, tax etc. or any other cost associated with the trade

f. buyer specifies whether it is an open-bid or a sealed-bid process

g. sellers bid for the items by accessing server data processing machine through the client data processing machines comprising steps of:
   i. sellers pick and choose individual items or a group of items they wish to sell and bid for the items
   ii. sellers pick any combination of items in any quantity - quantity chosen by seller j satisfies the following equation:

$$0 <= Q_i^j <= Q_i.$$

Where

Q_i^j is quantity of item i chosen by seller j

Q_i is the quantity of item i buyer wants to procure

   iii. the server data processing machine accepts the bids and stores them in the database
   iv. the optimization program residing in the server data processing machine processes the bids and calculates the winning bids based on the bid amount and additional information provided by buyer as recited in claim 11.e to find the winning bids
   v. the winning bids claimed in 11.g.iv are calculated such that the buyer procures all items at the lowest cost
   vi. the optimization program as claimed in11.d.iv solves the following problem:

Minimize: $P_1*Y_1 + P_2*Y_2 + \ldots\ldots P_n* Y_n$
Within constraints:

$$Q_1^1 + Q_1^2 + Q_1^3 + \ldots\ldots\ldots + Q_1^n = Q_1$$
$$Q_2^1 + Q_2^2 + Q_2^3 + \ldots\ldots\ldots + Q_2^n = Q_2$$

$$Q_m^1 + Q_m^2 + Q_m^3 + \ldots\ldots\ldots + Q_m^n = Q_m$$

Y_1 either 0 or 1
Y_2 either 0 or 1

Y_n either 0 or 1

Where

Q_i is the quantity of item i in the lot

m is the number of different products classes in the lot

n is the number of bids

P_j is the net cost to the buyer if seller j is selected as one of the winning bids. P_j is the equal to the price quoted by

seller j plus any additional cost that will be borne by the buyer for choosing seller j as the winning bidder

Q_m^n is the quantity of item m chosen by buyer n

vii. the method in 11.g.vi uses any of the following optimization techniques for optmization: linear programming, integer programming, domain reduction and constraint propagation, combinatorial optimization, genetic algorithms, simulated annealing or any other way for solving the problem that might be available

viii. the optimization program claimed in 11.g.vi solves for values of Y_i, i = 1 to n

ix. if Y_n is 1, then bid n is one of the winning bids.

x. step 11.g.iv is executed whenever a new bid is submitted

xi. steps 11.g.i to 11.g.iv go on till the time the bidding process ends at the time specified in 11.c

xii. after the expiration of time specified in 11.c, the bidding process ends and the winners are declared based on the last process run by step 11.g.iv

xiii. if the bidding process is an open-bid process, then winning bids are displayed continuously to the buyers during the bidding process else if the process is a sealed-bid process, then the winning bids are not displayed to the buyers until after the bidding ends and winner are declared

INVENTION'S APPLICATION

The described mechanism can be easily implemented though a system of computer networks.

The previously mentioned needs are addressed by the present invention, in which market participants will be able to exchange among themselves, a combination of products as a bundle. The present invention can be applied to set up an online digital marketplace or exchange system addressing the above-mentioned needs. This online system can be easily developed through a set of computers connected through a network. This system of computer network executing a trade matching mechanism provides the function of a market intermediary, recombining products from different market participants such that the requirements of participants seeking to acquire a particular combination of products are satisfied by participants seeking to dispose of the same products. The invention provides a mechanism for exchange of multiple products between two or more market participants. An online digital marketplace for the exchange of goods as mentioned in this invention can be implemented using a set of computers connected through a network.

This computer network could be in any form like a private network or a public network like Internet or World Wide Web.

The invention mentioned here can be used for a variety of exchange mechanisms. One of them is auction. The auction can be used for either disposing of products or for acquiring products. An online mechanism where businesses can post their products for sale or post their Request for Quotes or Request for Proposal or tenders. This online exchange will deal with disposing or acquisition of multiple products and help business efficiently trade goods as mentioned in the invention.

Throughout this document, the terms "objects", "items", and "units" are used essentially interchangeably. The inventive system may be used both for tangible objects, such as real or personal property, and intangible objects, such as telecommunications licenses or electric power or services. The inventive system may be used for trading where the business entity is a seller, buyer or broker, the users are buyers, sellers or brokers, and for trading-like activities which cannot be interpreted as selling or buying. The inventive system may be used for items including, but not restricted to, the following: public-sector bonds, bills, notes, stocks, and other securities or derivatives; private-sector bonds, bills, notes, stocks, and other securities or derivatives; communication licenses and spectrum rights; electric power and other commodity items; airport landing slots; emission allowances and pollution permits; and other objects, items or property, tangible or intangible.

It should be emphasized that whenever this document refers to "multiple dissimilar" objects, the terminology should be interpreted as meaning that the mechanism is capable of effecting the auctioning of multiple dissimilar objects. However, there is no requirement that the objects auctioned be multiple or dissimilar, and the mechanism and its implementation can also be used for exchange of identical or similar objects. By the same token, whenever the document refers to "multiple identical" objects, the terminology should be interpreted as referring to a context where bidders primarily are concerned with the quantity of items they receive, as opposed to the identity of the individual objects they receive. As such, "identical" objects can also be used for "close substitutes" or for a single object.

In here, the term cost means any cost such as tangible, intangible, quantifiable or perceived cost. The cost could include such costs as shipping and handling, tax, quality cost, reliability of delivery etc. or any cost the buyer or seller sees fit to add to that particular trade.

Although various advantages and applications of the present invention have been described herein in detail, it will be appreciated by those skilled in the art, that variations may be made thereto without departing from the spirit and scope of the invention.